CARDIOVASCULAR SYSTEM

1. Which of the following is part of the reflex response to an increase in arterial pressure?

a) Decreased firing of carotid sinus baroreceptors
b) Increased sympathetic activity to the ventricles
c) Increased parasympathetic activity to the SA Node
d) Increased parasympathetic activity to the arterioles of skeletal muscles & skin
e) Increased parasympathetic stimulation to the ventricles

2. Correct sequences of steps in short-term compensation for hemorrhage include*:*

a) Decreased arterial pressure → Increased baroreceptor firing rate
b) Increased formation of Angiotensin II → Increased renin released by kidneys
c) Decreased excretion of Na^+ and water → Increased aldosterone formation
d) Decreased firing of baroreceptors → Increased sympathetic activity
e) Decreased atrial volume → Increased volume receptor firing rate

3. Venous Return*:*

a) Is increased on standing
b) Decreases by deep inspiration
c) Is decreased by venoconstriction
d) When increased, activates Bainbridge reflex
e) When increased, increases end-systolic volume

4. The nerve supply to the heart is as follows:

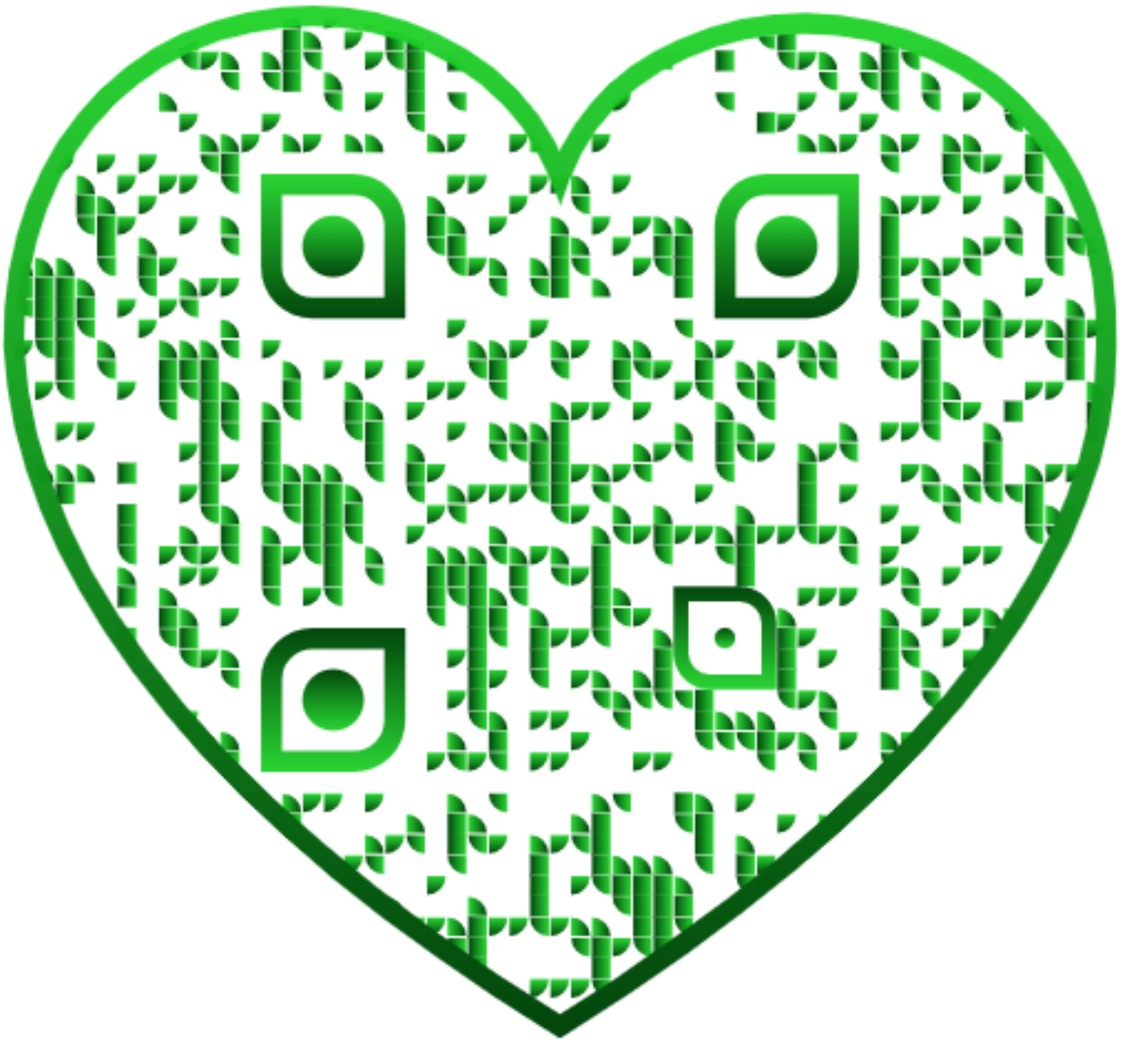
a) SA Node is innervated by sympathetic only
b) Atrial muscle is innervated by both sympathetic & parasympathetic
c) Right vagus supplies SA node & AV node
d) Left vagus supplies SA node
e) Parasympathetic supplies ventricular muscle

5. Which of the following is not a characteristic of cardiac muscle?

a) It's a syncytium of muscle fibers
b) There are intercalated discs
c) Gap junctions cause spread of depolarization
d) Has myosin and actin muscles
e) There are paracellular spaces

6. The pacemaker prepotential*:*

a) Is due to a slow decrease in K+ influx
b) Is a slow increase in Resting Membrane Potential
c) Maintained by opening of long acting Ca2+ channels
d) Is augmented by opening of transient Ca2+ channels
e) Occurs only in the SA node



7. Parasympathetic stimulation results in*:*

a) Decreases K+ efflux in cardiac muscle
b) Increases Ca2+ influx in SA node
c) Bradycardia
d) Increases Na+ influx
e) Increasing slope of prepotential

8. Which of the following is true of the electrical activity of cardiac muscle?

a) Increased extracellular K+ causes depolarization
b) Repolarization is due to Na+ current
c) Extracellular Na+ affects the pacemaker potential
d) Plateu of action potential is due to Ca2+ influx
e) Initial repolarization is due to delayed K+ efflux

9. The conductive system of the heart does not include:

a) Internodal pathways
b) Bundle of His & its branches
c) Purkinje system of fibers
d) Interventricular septum
e) AV node

10. Which of the following is not true of the ECG?

a) Needs six pairs of electrodes
b) Is useful in detection of arrhythmias
c) It is recorded from limb leads
d) Its amplitude indicates the mass of cardiac muscle
e) The PR interval indicates strength of contraction

11. In a normal ECG:

a) The P wave indicates the condition of the conductive system
b) The P wave represents depolarization of atrial myocardium
c) QRS complex is mainly negative due to spread of depolarization down
d) QRS is due to depolarization in the ventricular septum
e) The T wave is a positive wave in all chest leads

12. Which of the following is true of the cardiac cycle?

a) Ventricular diastole follows atrial systole
b) Ventricular systole causes an immediate rise in aortic pressure
c) The beginning of systole causes closure of AV valves
d) Closure of semi-lunar valves gives rise to first heart sound
e) Isovolumetric relaxation occurs at the end of diastole

13. In the atrial pressure wave*:*

a) The maximum pressure is about 12 mmHg
b) Pressure remains constant while AV valves are closed
c) The C wave is due to bulging of AV valve during ventricular filling
d) The V wave is due to filling of the ventricles
e) The A wave is due to atrial systole

14. Protodiastole:

a) Is characterized by a rapid rise in aortic pressure
b) Occurs at the onset of diastole
c) Is a period in the cardiac cycle with constant blood pressure
d) Is the last one-third of diastole
e) Is a period of slow ejection from the ventricles

15. Which of the following statements is true of the heart sounds*?*

a) The first sound is of high pitch
b) The first sound is of longer duration than the second
c) They are produced by abnormal valves
d) The second sound is heard best at the apex
e) The second sound is due to the closure of AV valves

16. Pressure in the pulmonary artery is:

a) Higher than that in the right atrium
b) About 25 mmHg during systole
c) About 80 mmHg during diastole
d) Is lower than that in the right ventricle
e) Is regulated by parasympathetic innervation

17. The following is not correct about baroreceptors*:*

a) Found in the wall of carotid sinuses
b) Found in the aortic arch
c) Monitor pressure in the arterial system
d) Send impulses through the glosso-pharyngeal nerve
e) Normally fires during late systole

18. Chemoreceptors are:

a) Found in aortic and carotid sinuses
b) Stimulated best by hypercapnoea
c) Send impulses to vasomotor center through vagus nerve
d) Have a high blood flow rate
e) Are not sensitive to hydrogen ion concentration

19. At rest the LV end-systolic volume is:

a) 10 mL
b) 30 mL
c) 50 mL
d) 120 mL
e) 140 mL

20. The best site to measure mixed venous PO2 is*:*

a) Superior Vena Cava
b) Right Atrium
c) Pulmonary Artery
d) Pulmonary Vein
e) Left Ventricle

21. The atrial contraction component of ventricular filling is*:*

a) 5%
b) 10%
c) 30%
d) 50%
e) 80%

22. The lowest intrinsic discharge activity resides in the:

a) SA Node
b) AV Node
c) Bundle of His
d) Bundle of branches
e) Purkinje fibers

23. The highest oxygen extraction is found in the:

a) Resting skeletal muscles
b) Heart
c) Kidney
d) Brain
e) Skin

24. With a mixed venous oxygen content of 110 ml/L and an arterial oxygen content of 150 ml/L an oxygen uptake of 280 ml/min, the cardiac output is*:*

a) 5 liters/ min
b) 6 liters/ min
c) 7 liters/ min
d) 8 liters/ min
e) 9 liters/ min

25. The pulmonary valve closes when the pressure in the right ventricle is about*:*

a) 0 mmHg
b) 15 mmHg
c) 30 mmHg
d) 50 mmHg
e) 120 mmHg

26. The velocity of blood flow is the slowest in:

a) Capillaries
b) Pulmonary vein
c) Small arteries
d) Inferior Vena Cava
e) Arterioles

27. The volume of blood is greatest in:

a) Systemic capillaries
b) Veins
c) Arteries
d) The spleen
e) The heart

28. Which of the following results in increased stroke volume?

a) An increase in end-diastolic volume
b) An increased after-load
c) Parasympathetic stimulation
d) An increase in the heart rate
e) Venodilation

29. During the cardiac cycle, closure of the aortic valve occurs at:

a) The end of isovolumetric contraction
b) The beginning of rapid ejection phase
c) The beginning of isometric relaxation
d) The end of systole
e) The end of rapid filling phase

30. SA node is the pacemaker of the heart because:

a) Location in the right atrium
b) Neural control
c) Natural leakiness to Cl-
d) Natural leakiness to K+
e) Fastest rate of discharge

31. Stroke Volume*:*

a) Is the volume of blood pumped by the heart per minute
b) Decreases by increased end-diastolic volume
c) Is decreased by increased afterload
d) From the left ventricle is more than from the right ventricle
e) Multiplied by heart rate gives cardiac index

32. In the ECG, the T wave denotes:

a) Atrial contraction
b) Atrial depolarization
c) Ventricular repolarization
d) SA node depolarization
e) Ventricular contraction

33. Cardiac Output (in liters per minute) divided by the heart rate (in beats per minute) equals to:

a) Cardiac Index
b) Cardiac Efficiency
c) Mean Arterial Pressure
d) Stroke Volume
e) Blood Velocity

34. The segment of the vascular bed responsible for local regulation of blood flow in most tissues is:

a) Distributing arteries
b) Large veins
c) Capillaries
d) Venules
e) Arterioles

35. Absolute refractory period of the heart*:*

a) Corresponds to the duration of relaxation
b) Lasts till half of cardiac contraction
c) Shorter than refractory period in skeletal muscle
d) Lasts till cardiac contraction
e) The heart can be stimulated by very strong stimulus

36. First heart sound occurs at the beginning of:

a) Isometric relaxation
b) Isotonic relaxation
c) Isovolumetric contraction
d) Isovolumetric relaxation
e) Atrial contraction

37. In the heart, within physiological limits the force of contraction is directly proportional to the*:*

a) Pacemaker activity
b) AV nodal delay
c) Initial length of cardiac muscle
d) Respiratory rate
e) Vagal stimulation

38. Cardiac muscle has a long refractory period because:

a) The impulse takes about 0.2 s to travel from SA to AV node
b) It obeys the all-or-none law
c) Of the delay in Na+ influx
d) Of Ca2+ influx
e) Is more permeable to K+

39. Stimulation of baroreceptors leads to:

a) Tachycardia
b) Increased stroke volume
c) Stimulation of vasomotor center
d) Vasoconstriction
e) Decreased arterial blood pressure

40. The fourth heart sound is due to:

a) Closure of mitral and tricuspid valve
b) Iso-volumetric contraction
c) Iso-volumetric relaxation
d) Ventricular filling
e) Atrial systole

41. Frank Straling's law of the heart:

a) Explains the tachycardia caused by increased venouse return
b) Explains the tachycardia of exercise
c) Does not operate when the person is at rest
d) Explains the increased venous return when end-diastolic volume is increased
e) Explains the increased stroke volume when end-diastolic volume is increased

42. The work done by the right ventricle is much less than that done by the left ventricle because its*:*

a) Wall is thinner
b) Stroke volume is less
c) Preload is less
d) Afterload is less
e) Systolic pressure is less

43. The following are not signs of pure right ventricular failure:

a) Increased central venous pressure
b) Central venous engorgement and pulsations
c) Pulmonary oedema
d) Hepatomegally
e) Sacral oedema

44. The blood vessel responsible for local regulation of blood flow in most tissues is:

a) Distributing arteries
b) Large veins
c) Capillaries
d) Venules
e) Arterioles

45. The heart rate is increased by all the following *except*:

a) Fever
b) Increased venous return
c) Atropine
d) Hypothyroidism
e) Adrenaline

46. Stroke Volume*:*

a) Increases as a result of increased afterload
b) Equals end-diastolic volume minus end-systolic volume
c) Increases as heart rate is increased by electrical pacing
d) Is increased by parasympathetic stimulation
e) Is increased by Ca^{2+} channel blocks

47. A drug that increases the heart rate from 70 to 100 beats per minute could be:

a) Stimulation of B-1 adrenergic receptors
b) Inhibitor of alpha adrenergic receptors
c) Stimulation of muscarinic cholinergic receptors
d) Inhibitor B-2 adrenergic receptors
e) Digitalis

48. A high preload is indicated by*:*

a) Blood volume
b) Pulmonary pressure
c) End-diastolic volume
d) Systolic blood pressure
e) Diastolic blood pressure

49. Regurgitation of aortic valve leads to:

a) A decrease in diastolic pressure
b) A decrease in oxygen-consumption by the ventricles
c) A decrease in heart rate
d) A systolic murmur
e) A decreased end-systolic volume

50. Which of the following results in a decreased stroke volume?

a) An increase in end-diastolic volume
b) An increased afterload
c) Parasympathetic stimulation
d) A decrease in total peripheral resistance
e) Increased residual volume

51. An increase in pulse pressure can be caused by:

a) Parasympathetic stimulation
b) Generalized vasodilation
c) Severe hemorrhage
d) Aortic stenosis
e) Heart failure

52. On assuming the upright posture, one would expect*:*

a) Stimulation of Renin-angiotensin system
b) Increased pulmonary artery pressure
c) A decrease in pulse rate
d) Venodilation
e) An increase in renal blood flow

53. Central venous pressure increases:

a) In hypovolaemia
b) By sympathetic stimulation
c) When total peripheral resistance increases
d) When the cardiac output decreases
e) With increased sodium loss

54. Infusion of nor-adrenaline is expected to produce:

a) A decrease in firing-rate of baroreceptors
b) A reflex brachycardia
c) A decrease in total peripheral resistance
d) Increased myocardial contractility due to B2 receptors
e) An increase in cardiac output

55. Stroke volume is decreased when:

a) The sympathetic nerves are stimulated
b) The arterial blood pressure falls
c) Vagal centers are stimulated
d) The end-diastolic volume is increased
e) A patient stands up

56. Generalized vasoconstriction may be produced by:

a) Exposure to heat
b) Parasympathetic stimulation
c) An increase in vasomotor tone
d) When the depressor center is stimulated
e) An exposure to a large dose of histamine

57. Arterial vasoconstriction in a limb leads to:

a) An increase in capillary pressure
b) A decrease in arteriovenous oxygen difference
c) Diminished filteration in capillary bed
d) An increase in blood pH leaving the limb
e) Venoconstriction

58. Which of the following is the most important in determining the total peripheral resistance?

a) Blood viscosity
b) Concentration of plasma protein
c) Arteriolar diameter
d) Cardiac Output
e) Metabolic autoregulation

59. Venodilation at rest leads to:

a) A decrease in venous return
b) A drop in arterial blood pressure
c) Flushing of the skin
d) A decrease in peripheral resistance
e) Increased capillary fluid exchange

60. Stroke Volume:

a) Is normally about 90mL
b) Depends on Bainbridge reflex
c) Decreases when the heart rate increases
d) Increases when the end-diastolic volume increases
e) Is mainly controlled by vagal fibers

61. Starling's Law of the heart describes the relationship between:

a) The heart rate and stroke volume
b) The end-diastolic volume cardiac output
c) The blood pressure and heart rate
d) The initial length of cardiac muscle fibers and force of contraction
e) Sympathetic stimulation stroke volume

62. Increased pressure in the carotid sinus leads to:

a) An increase in vasomotor tone
b) Increase in vagal tone
c) Reflex vasoconstriction
d) Venoconstriction
e) Tachycardia

63. In the jugular pulse wave the wave "C":

a) Occurs before the "a" wave
b) Is due to atrial systole
c) Closure of the atrioventricular valve
d) Co-asides with the atrial pulse wave
e) Is due to bulging of tricuspid valves

64. The first heart sound:

a) Is due to vibrations in the aorta on closure of the semilunar valves
b) Is caused by closure of tricuspid valve
c) Occurs at the end of isometric contraction of the ventricle
d) Is caused by closure of both atrioventricular valves
e) Is short of high pitch

65. The Cardiac output is:

a) The volume of blood pumped by the heart in one minute
b) Equal to the heart rate multiplied by the stroke volume
c) Measured by dilution method
d) Increased on standing up
e) Greater in left ventricle than the right

66. The chemoreceptors are found in:

a) The lungs
b) Glomus bodies
c) Aortic arch
d) Carotid sinus
e) Medulla

67. Local vasodilation can be produced by:

a) Neural reflexes
b) Myogenic autoregulation
c) An increase in PO_2
d) A decrease in H+ concentration
e) Synthesis of ATP

68. The following are expected to increase the cardiac output *except*:

a) Eating
b) Adrenaline Infusion
c) Moderate rise in environmental temperature
d) A 10 degree rise in body temperature
e) Pregnancy

69. Regarding the cardiac cycle which of the following is incorrect?

a) The first heart sound occurs at the start of isovolumetric contraction
b) The "v" wave of atrial pressure occurs during diastole
c) The third heart sound occurs during ventricular diastole
d) The second heart sound occurs in late systole
e) Ventriculor systole continues after the end of the ECG wave

70. The Frank-Starling law explains all the following except:

a) Increase in cardiac with increase in venous return
b) Maintenance of stroke volume in the phase of increased afterload
c) Matching left ventricular output with right ventricular output
d) The increased contractility induced by sympathetic stimulation
e) The normal cardiac output in hypertensive patients

71. A drug that increases the heart rate from 70 to 100 beats per minute could be:

a) A B1-adrenergic receptor antagonist
b) A cholinergic receptor antagonist
c) A cholinergic receptor agonist
d) A B2 adrenergic receptor agonist
e) A non-cholinergic, non-adrenergic agonist

72. Excitation of the ventricles:

a) Proceeds from the subendocardium to the subpericardium
b) Leads to excitation of the atria
c) Results from the action of norepinephrine on ventricular muscle
d) Occurs 2.2 seconds following atrial excitation
e) Results from pacemaker potentials in ventricular cells

73. AV nodal cells:

a) Exhibit action potentials characterized by rapid depolarization
b) Conduct impulses more slowly than either atrial or ventricular cells
c) Are capable of pacemaker activity at an intrinsic rate of 100 beat per minute
d) Exhibit increased permeability to Na+ during the prepotntial
e) Show a steep pre-potential when exposed to acetylcholine

74. Stroke Volume:

a) Increases as a result of increased afterload
b) Equals end-diastolic volume minus end-systolic volume
c) Increases as the heart rate is increased by electrical pacing
d) Is increased by parasympathetic stimulation
e) Is increased by Ca-channel blockers

75. Coronary blood flow of the left ventricle:

a) Is mainly regulated by sympathetic supply to coronary arterioles
b) Increases when sympathetic nerves to the heart are blocked
c) Is highest during systole because of myocardial activity
d) Increases when myocardial metabolism increases
e) All of the above are correct

76. The strength of myocardial contraction:

a) Increases as a result of increased afterload
b) Equals end-diastolic volume minus end-systolic volume
c) Increases as heart rate increases by electrical pacing
d) Is increased by parasympathetic stimulation
e) Is increased by calcium channel blockers

77. Increased arterial blood pressure leads to:

a) Decreased firing of carotid sinus baroreceptors
b) Increased sympathetic activity to the ventricles
c) Increased parasympathetic activity to the sinoatrial node
d) Increased parasympathetic activity to arterioles of skeletal muscles and skin
e) Increased parasympathetic stimulation to the ventricles

78. Which of the following is likely to cause postural hypotension?

a) Drugs that block muscarinic cholinergic receptors
b) Decreased firing rate of baroreceptors while standing
c) Exposure to cold environment
d) Drugs that block cholinergic receptors in skeletal muscle vessels
e) Drugs that activates cholinergic receptors in autonomic ganglia

79. Stimulation of parasympathetic nerves to the heart:

a) Causes tachycardia
b) Makes the prepotential more horizontal
c) Decreases the rate of potassium efflux in the sino-atrial node
d) Prolongs the refractory period
e) Shortens the duration of the cardiac cycle

80. The prepotential of the pacemaker is mainly due to:

a) Calcium influx in the early phase
b) Increased K+ efflux
c) Increased chloride influx
d) Decreased K+ efflux
e) Decreased Na+ influx

81. The vessels responsible for regulation of blood pressure:

a) Medium-size arteries
b) Small veins
c) Capillaries
d) Venules
e) Arterioles

82. The advantage of the Starling mechanism in the heart is to:

a) Decrease fluid loss from the cardiac capillaries
b) Ensure that the ventricles operate at an optimum length
c) Couple the efficiency of muscle contraction to the heart rate
d) Match the output of one ventricle to that of the other
e) Ensure that the right and left arterial pressure are equal

83. An increase in arterial pulse pressure is observed in association with:

a) Exposure to cold
b) An increased peripheral resistance
c) Hypothyroidism
d) An increased vagal activity
e) Muscular exercise

84. A decrease in carotid sinus pressure would lead to a decrease in:

a) Heart rate
b) Myocardial contractility
c) Total peripheral resistance
d) Capacity of venous system
e) Cardiac output

85. In the ECG, the QRS wave is due to:

a) Atrial contraction
b) Atrial depolarization
c) Ventricular depolarization
d) SA node depolarization
e) Ventricular contraction

86. In the ECG, the P wave denotes:

a) Atrial contraction
b) Atrial depolarization
c) Ventricular repolarization
d) SA node depolarization
e) Ventricular contraction

87. Stimulation of sympathetic nerves to the heart:

a) Causes tachycardia via alpha-adrenergic receptors
b) Makes the prepotential more horizontal
c) Decreases the rate of potassium efflux in the SA node
d) Prolongs the nodal delay
e) Has no effect on the duration of the cardiac cycle

88. Concerning the heart sounds:

a) The first heart sound is due to closure of the atrioventricular valves
b) The second heart sound is due to opening of the aortic and pulmonary valves
c) The third heart sound is due to atrial systole
d) The first heart sound occurs at the beginning of the isovolumetric relaxation phase
e) The second heart sound is followed by isovolumetric contraction phase

89. In the normal ECG the duration of PQ interval is usually:

a) 0.10 sec
b) 0.15 sec
c) 0.30 sec
d) 0.45 sec
e) 0.60 sec

90. Starling's Law of the heart:

a) States that at a given end-diastolic pressure, norepinephrine increases the volume
b) States that increased end-diastolic volume leads to an increased stroke volume
c) Is primarily the result of changes in the firing rate of sympathetic nerves to the ventricles
d) Is independent of the venous return
e) Describes the myocardial response to an increased heart rate

91. In the heart, transmission of impulses is fastest in*:*

a) Atrial muscles
b) Bundle of His
c) Ventricular muscles
d) Purkinje fibers
e) AV nodal fibers

92. The force of contraction of cardiac muscle is a function of:

a) Initial muscle length
b) Body temperature
c) Duration of the action potential
d) End-systolic volume
e) Number of impulses that reach the muscle cell per unit time

93. The second heart sound occurs:

a) During protodiastole
b) During isovolumetric relaxation
c) During isovolumetric contraction
d) 0.5 seconds after the first heart sound
e) At the peak of ejection period

94. The P wave of the ECG:

a) Occurs during rapid atrial inflow
b) Follows the "a" wave of atrial pressure
c) Is essential for development of normal QRS complex
d) Occurs during ventricular diastole
e) Is prominent in atrial fibrillaton

95. Which is true of cardiac muscle:

a) All cardiac muscle cells have pacemaker potentials
b) The rate of cardiac muscle contraction is always set by nerves to the heart
c) Impulses spread easily from one muscle cell to another
d) Cardiac muscles look smooth under the microscope
e) Cardiac muscles have relatively short refractory periods compared to skeletal muscles

96. Stimulation of the right vagus nerve:

a) Increases the heart rate
b) Increases arterial blood pressure
c) Has a reduced effect after administration of physostigmine
d) Has a reduced effect after administration of atropine
e) Has a reduced effect after administration of prornaolol

97. Which of the laws explain the relationship between vessel wall tension and vessel radius:

a) Poiseuille's Law
b) Ohm's Law
c) Starling's Law
d) LaPlace's Law
e) Reynold's Law

98. Which of the following are not innervated by sympathetic nerves*?*

a) Large arteries
b) Arterioles
c) Venules
d) Capillaries
e) Large veins

99. Which of the following substances will be most likely to dilate systemic arterioles:

a) Endothelin
b) ADH
c) Histamine
d) Noreadrenaline
e) Aldosterone

100. Resistance to venous return:

a) Is higher during exercise than at rest
b) Equals to the slope of the venous return curve
c) Is reduced by sympathetic stimulation
d) Increases by increase in circulatory filling pressure
e) Increased by constriction of arterioles

101. Closure of the aortic valve occurs at:

a) The end of isovolumetric contraction
b) The beginning of isometric relaxation
c) The end of systole
d) The end of rapid filling phase
e) The beginning of rapid ejection phase

102. An increase in the pulse pressure can be caused by:

a) Parasympathetic stimulation
b) Generalized vasodilation
c) Sympathetic stimulation
d) Venodilation
e) Heart failure

103. The contribution of atrial contraction to ventricular filling is greatest:

a) When sympathetic stimulation is pronounced
b) At rapid heart rates
c) When atria and ventricles contract simultaneously
d) During atrial fibrillation
e) During bradycardia

104. The baroreceptor reflex mainly regulates:

a) Stroke volume
b) Heart rate
c) Mean arterial blood pressure
d) Systolic blood pressure
e) Diastolic blood pressure

105. Which of the following is a characteristic of cardiac muscle?

a) It has a long refractory period compared to skeletal muscle
b) There are electrical synapses
c) Gap junctions cause limitation of depolarization
d) Has myosin but no actin molecules
e) There are para cellular spaces

106. Factors affecting the strength of ventricular muscle include:

a) Parasympathetic inhibition
b) The length of muscle fibers
c) The length of plateau phase
d) Sympathetic stimulation
e) End-systolic volume

107. Stimulation of parasympathetic supply to the heart results in:

a) Decrease K^+ efflux in cardiac muscle
b) Increases Ca^{2+} influx in SA node
c) Increased delay in AV node
d) An increase in Cl- influx
e) Opening of sodium channel

108. The following increase the cardiac output *except*:

a) Sympathetic stimulation
b) Venodilation
c) Fever
d) Anemia
e) Exercise

109. The cardiac output is increased:

a) By stimulation of sympathetic beta-1 receptors
b) Increased impedance in the aortic arch
c) By high pressure in the arterial system
d) By impulses through the glosso-pharygeal nerve (ix)
e) In hypothyroidisim

110. Ventricular Depolarization:

a) Follows immediately after the closure of atrioventricular valves
b) Occurs during mid systole
c) Depends on sympathetic stimulation
d) Occurs 0.2 sec following atrial excitation
e) Results from pacemaker cells in ventricular cells

111. The isovolumetric relaxation phase of the ventricles:

a) Is associated with rapid filling
b) Occurs during late diastole
c) Ends by opening of the atrioventricular valves
d) Results in falling of ventricular pressure by about 10 mmHg
e) Is marked by the first heart sound

112. Factors that increase the stroke volume include:

a) An increased afterload
b) A high end-diastolic volume
c) An increased heart rate
d) Parasympathetic stimulation
e) Ca^{2+} channel blockers

113. After a loss of one liter of blood:

a) The heart rate decreases slightly
b) Baroreceptors increase their discharge
c) The chemoreceptors have no role
d) The end diastolic volume increases
e) There is increased vasomotor tone

114. A large infarct affecting the left ventricle causes:

a) Pulmonary capillary hydrostatic pressure to decrease
b) Left ventricular end systolic pressure to increase
c) Heart rate to decrease
d) The systolic blood pressure to decrease
e) Congestion of the liver

115. The blood vessels responsible for exchange between plasma & interstitial fluid are:

a) Distributing arteries
b) Large veins
c) The capillaries
d) The venules
e) Arterioles

116. Conduction velocity of cardiac impulse is slowest in:

a) Atrial myocardial fibers
b) AV nodal fibers
c) Purkinje fibers
d) Ventricular myocardial fibers
e) His bundle fibers

117. The contribution of atrial contraction to ventricular filling is greatest:

a) When vagal activity is pronounced
b) At rapid heart rates
c) When atria and ventricles contract simultaneously
d) During atrial fibrillation
e) Early during ventricular diastole

118. The most important function of the Starling mechanism in the heart is:

a) To decrease fluid loss from the cardiac capillaries
b) To ensure that the ventricles operate at an optimum length
c) To couple the efficiency of muscle contraction to the heart rate
d) To match the output of one ventricle to that of the other
e) To ensure that right and left atrial pressures are equal

119. The highest coronary blood flow occurs:

a) Early during systole
b) When the left ventricular pressure is high
c) At the beginning of isovolumetric contraction
d) Towards the end of ventricular diastole
e) At the beginning of diastole

120. Which of the following results in an increased stroke volume?

a) An increase in end-diastolic volume
b) An increased afterload
c) Parasympathetic stimulation
d) An increase in the heart rate
e) Venodilation